CHANGES IN HEALTH RESULTING FROM THE "INTERNSHIP PROCESS" IN A COHORT OF PROFESSIONAL PSYCHOLOGY DOCTORAL STUDENT APPLICANTS

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DEDICATION

To my wonderful wife and daughters, thank you for your love and support.

ABSTRACT

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Graduate students enrolled in clinical, counseling, and school psychology doctoral programs are required to complete a one-year internship prior to graduating and earning their degree. Recently, an imbalance has grown between the number of internship positions and the number of applicants, with more applicants than available internship positions. This creates a period of intense stress and demand on prospective interns as they apply for, interview for, and receive word of pairing results to internship sites. This stress may negatively impact interns' health and wellness over the application/interview period. To date, this remains an area that has not previously been studied. The current study utilizes a hierarchical, latent variable model of global health, with a global health factor comprised of five first-order factors: Physical health, mental health, spiritual health, social health, and stress (IS-Wel model; Hattie, Myers, & Sweeney, 2004). Using a time-interrupted series design, participants wore a physical activity monitor, completed semi-weekly surveys, and logged food intake via an online application across three phases lasting three, four, and three weeks, respectively.

Using partial least squares structural equation modeling (PLS-SEM), the model was analyzed for fit and predictive validity. Subsequently, means structures were assessed for significant changes across phases, as well as accounting for the influence of resilience as a covariate, within SPSS using a MANCOVA analysis. Paired-sample *t*-tests were further used to analyze specific areas and direction of change. Results indicated non-significant changes in health across phases, as well as a non-significant interaction between resilience and health by phase. These results indicate that prospective interns are able to effectively cope with the multiple stressors unique to this period of training.

KEY WORDS: Partial Least Squares-Structural Equation Modeling, Global health, Internship, Physical activity monitor, Resilience

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CHAPTER I

Introduction

The World Health Organization (WHO) provided a standard definition of health more than 60 years ago: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (WHO, 1948). This definition has not been changed over the ensuing 60-plus years and has promoted a model of overall health and wellbeing that encompasses more than just the physical, mental, and social constituents. There exists an extensive corpus of literature examining the relationships between physical, mental and social health, although the literature on global or general wellness comprised of these individual elements is somewhat less developed. For example, a PsychINFO search conducted using the term "general wellness" returned 78 results, whereas a search of "physical health" returned 27,245 results, "mental health" returned 407,074 results, and "social health OR social wellness" returned 30,715 results, with most of the latter terms (social health *or* social wellness) addressing social interaction and either mental or physical health and wellness. Despite the interactive and reciprocal nature of the multiple dimensions of health, it appears that the majority of studies assessing health do so with a narrower focus; however, this focus may miss important aspects of human health and wellness.

The Indivisible Self Model of Wellness

Consistent with the WHO's (1948) definition of health, several models have been proposed that assess the concept of "global" or "overall" health or wellness. One of the first models to be studied was developed by Hettler (1980) and consisted of six dimensions underlying the overarching wellness factor: intellectual, emotional, physical, social, occupational, and spiritual wellness. Although the hexagonal model proposed by Hettler (1980) was represented as being holistic, the main emphasis was primarily on the relationship of other dimensions to the individual's physical health (Myers & Sweeney, 2008). In response, Sweeney and Whitmer (1991) and Witmer and Sweeney (1992) developed a model of wellness that integrated spiritual, physical, mental, and interpersonal dimensions with the goal of improving overall wellness and quality of life. The initial version, the Wheel of Wellness, was conceptualized as 17 dimensions on a wheel, with spirituality as the hub. This model was based on the Wellness Evaluation of Lifestyle (WEL; Myers, Sweeney, & Witmer, 1998) measure as a tool for counselors to guide clients in wellness-oriented counseling (Myers & Sweeney, 2008). Hattie, Myers, and Sweeney (2004) conducted structural equation modeling analyses of over 5,000 WEL records and found a three-level factor structure, with the third level factor as overall wellness, five second-level factors, and 17 first-level factors. The observed structure produced the Indivisible Self model (IS-Wel; Hattie et al., 2004), comprised of an overarching first-level factor of overall wellness, and secondary factors of Creative, Coping, Social, Essential, and Physical. Each of these second-order factors is further comprised of several areas, including Exercise and Nutrition (Physical), Spirituality (Essential), Friendship and Love (Social), Stress Management and Realistic Beliefs (Coping), and Thinking and Emotions (Creative/Mental).

Regarding the assessment of physical health and activity as components of overall health and wellness, past research, including the research conducted with the IS-Wel model (Hattie et al., 2004), has typically utilized subjective self-report measures to assess these constructs. Concern has been voiced regarding possible discrepancies between objectively-reported and self-reported physical activity levels, specifically when assessing physical health (Downs, Van Hoomissen, Lafrenz, & Julka, 2014; Schuna, Johnson, & Tudor-Locke, 2013). This research has indicated that individuals typically overestimate both the duration and intensity of physical activity. Hamer and Stamatakis (2010) proposed that objective physical health may be a separate construct from general wellbeing, and utilized both physical activity monitors and a fitness test to assess physical activity and health, respectively, followed by an assessment of general wellbeing. They found that self-reported physical health was significantly positively correlated with general wellbeing, as well as a positive correlation between moderate-to-vigorous physical activity (MVPA) and self-rated health and wellness. One strength of this study is that it demonstrated the effectiveness of utilizing current objective measures of physical activity when assessing the complex relationships between physical activity, physical health, and general health and wellbeing. Thus, utilizing valid, objective measures of physical activity may improve the validity of the data obtained, and provide additional support for the previously mentioned relationships that have been observed.

The IS-Wel model has been used extensively to assess general health in a variety of populations over the course of several decades. Recently, Myers and Sweeney (2008) published a review of the IS-Wel model, as well as a brief summary of recent research and populations with which it has been used. These groups include school-aged children (Villalba & Myers, 2008), older adults in a retirement home setting (Myers & Degges-White, 2007), ethnic minorities (Chang, unpublished doctoral dissertation), college undergraduates (Myers & Bechtel, 2004; Osborne, 2005), and gay and lesbian populations (Dew, Myers, & Wightman, 2006).

The IS-Wel model has also been used to assess general health and wellness with graduate psychology students (Myers, Mobley, & Booth, 2003). In their study, Myers et al. (2003) compared overall health and wellness of first-year graduate counseling psychology students, advanced doctoral-level graduate students (final two years of study in the program), and the general sample used to validate the model. They hypothesized that, due to the rigorous nature of the training, students would report lower health scores than the general population. Surprisingly, however, results indicated that, in general, graduate students had higher levels of overall wellness compared to the general population. They proposed that this may be due to the application of principles learned in the program, or a possible pre-existing condition (such as comparably better overall health) that conferred benefits as they progressed through the application and acceptance process. Interestingly, the different groups in the Myers, Mobley, and Booth (2003) study (general population, first-year students, and advanced students) demonstrated different strengths and weaknesses when compared to each other. For example, results indicated that first-year graduate students were more likely to have higher Self-Care, Friendship, and Love wellness scores as compared to both the general population and advanced doctoral students, whereas the advanced doctoral students were more likely to report higher levels of wellness on Intellectual Stimulation and Total Wellness. The differences observed in this study, as well as other research conducted with the IS-Wel model tracking health and wellness over time, suggests a fluid and situation-dependent concept of health and wellness that may change depending on the stressors present in the environment, with each secondary health factor changing significantly in the presence of psychosocial stress.

The Effects of Stress on Health and Wellness

The transactional stress theory (Lazarus & Folkman, 1986) proposes that exposure to chronic or acute sources of stress (or both) may result in a negative impact on health. They posited that situations that exceeded the individual's ability to cope or deal with situations would result in decreased functioning across the entire spectrum of life (Folkman & Lazarus, 1980). This premise has been supported by a large body of evidence (for a review, see Thoits, 2010), such that the experience of various types of stress (chronic low level stress, acute traumatic stress) are often cumulative (Turner, Wheaton & Loyd, 1995) and predict a subsequent reduction in health across all domains (e.g., social, physical, mental, spiritual). The IS-Wel model (Hattie et al., 2004) posits that stress may result in a reduction in overall health and wellness, as well as reduced health in each of the constituent factors.

Stress and Social Health. Regarding the relationship between stress and social health, the majority of extant literature has examined the complicated and nuanced effects of social support on the relationship between stress and physical health (for a comprehensive review, see Newman & Roberts, 2013), with much of the research examining social interaction as a mediator between stress and health (Cohen, 2004; Cohen & Wills, 1985; Upadhyay & Singh, 2014), or as a positive direct effect on physical and mental health (Uchino, 2004). For example, Chang, Wray, and Lin (2014) examined physical health and social interactions between older adults and found that, in general, those individuals who had more frequent social interactions were found to have increased health. On the other hand, a recent study (Howell et al., 2014) examined social relationships and interactions in a forming social network, and found that increased social interactions were associated with improved mental health, but poorer physical health. Unfortunately, there is little research that has assessed the relationship between stress and the possible effects on social interaction, with an implied increase in stress corresponding to a decrease in social interaction and support. This different approach conceptualizes social health as both influencing, and being influenced by, the other dimensions of general health and wellness, and better captures the multi-directionality of these constructs.

Stress and Spiritual Health. Similar to the body of literature regarding stress and social health, the relationship between stress and spirituality is largely one of mediation, with spirituality acting as a buffer between stressful life experiences and mental or physical health. For example, Whitehead and Bergeman (2011) assessed daily stressors, experience of spiritual experiences (ESE), and positive and negative affect in an older adult population. They found that spiritual experiences buffered the negative effects of perceived stress on same-day negative affect, but enhanced same-day positive affect. Similarly, Reutter and Bigatti (2014) found that religiosity and spirituality were associated with improved health during stressful times, with spirituality partially mediating the stress-health relationship. Rowold (2011) found that increased spirituality predicted higher levels of physical wellbeing, lower levels of perceived stress, and increased happiness.

Stress and Mental Health. A large body of research has examined the relationship between stress and mental health, with results typically indicating a relationship in which higher levels of stress are associated with more mental health difficulties (Kleppa, Sanne, & Tell, 2008). High levels of perceived stress have been demonstrated to significantly contribute to increases in anxiety and depression (Markou & Cryan, 2012; Steinhardt, Smith-Jaggars, Faulk, & Gloria, 2011). For example, Falconier and colleagues assessed the effects of daily hassles or stress on mental, physical, and interpersonal health with couples in a committed relationship and found that self-rated health in all three areas declined with increased levels of perceived stress (Falconier, Nussbeck, Bodenmann, Schneider, & Bradbury, 2014). Similarly, Clark et al. (2011) examined the relationship between stress, job performance, physical health, and quality of life in a worksite wellness center. They found that individuals who reported high levels of stress also reported increased sleep problems, and reduced quality of life, physical health, beliefs of self-efficacy, as well as lower social support as compared to individuals reporting lower levels of perceived stress. It is ironic and somewhat disheartening that Clark et al. (2011) also found that those individuals reporting the highest levels of stress were the least likely to access or utilize available wellness programs due to reduced motivation, sense of self-efficacy, and numerous health problems. These findings have been replicated with a wide variety of populations, including a racially diverse sample of families (Schetter et al., 2013), physically active and less-active adults (Stults-Kolehmainen, Tuit, & Sinha, 2014), and college students (Pedersen, 2012).

Stress and Physical Health. Over the course of six decades since Hans Selye first published the seminal book *The Stress of Life* (1956), the relationship between stress and physical health has been studied extensively (Thoits, 2010). More recent research has supported this general relationship, as well as identifying additional mediators and moderators that may influence this relationship. For example, different types of stress have been correlated with reduced physical health in a wide variety of populations, including combat veterans (Nillni, Gradus, Gutner, Luciano, Shiperd, & Street, 2014), lesbian, gay, and bisexual individuals (Denton, Rostosky, & Danner, 2014), adults, (Stults-Kolehmainen et al., 2014), and undergraduate college students (Weekes, MacLain, & Berger, 2005). One important aspect of physical health is sleep hygiene and sleep quality (Mastin, Bryson, & Corwin, 2006), and research has indicated that a wide variety of stressors may negatively impact sleep (Benham, 2010), and, in turn, physical health. These relationships between stress and health may be observed across a variety of situations and phases of life, including graduate students.

Stress and Resilience. Previous research in the field of stress and resilience has indicated that the vast majority of individuals experience one or more stressful events across the lifespan (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Thoits, 2010). Despite this, most of those individuals who experience moderately or extremely stressful events recover with no more than minimal disruption in psychosocial functioning (Kessler, et al., 1995). Connor and Davidson (2003) proposed four possible outcomes when faced with an environmental stressor: 1) the stressful event provides an opportunity for growth and improvement in functioning, 2) the stressful event prompts the individual to move past the event or ignore it and maintain the current level of functioning, 3) the stressful event leads to loss, with a comparative decrease in functioning, however remaining stable, or 4) the stressful event promotes the use of maladaptive behaviors in an effort to cope with the stressor, resulting in continued distress and significantly reduced psychosocial functioning. One of the key factors in differentiating responses to stress is the proposed latent variable of resilience. Resilience has been defined as "the ability to adapt well and maintain a high level of psychological functioning following exposure to trauma or severe stress" (Pietrzak & Cook, 2013; Bonanno, Westphal, & Mancini, 2011), and is developed by successfully overcoming challenges or stressors, resulting in more positive self-cognitions and beliefs (Bensimon, 2012). It is important to note that, by definition, resilience requires exposure to a stressful event. Additionally, outcomes for individuals who score comparatively high on measures of resilience should report better psychosocial functioning as compared to their peers who score lower following a stressful period. Previous research has identified several factors associated with higher levels of resilience, including active lifestyle and physical activity, greater numbers of close friends, social activity, cognitive flexibility, and emotional stability (Southwick, Vythilingam, & Charney, 2005). It is clear from extant research that resilience may serve as a buffer, reducing the impact of stress on psychosocial functioning (Bonanno, Westphal, & Mancini, 2011; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Pietrzak & Cook, 2013; Southwick, Vythilingam, & Charney, 2005).

Stress and Wellness in a Graduate Student Population

With respect to graduate students in psychology (clinical, counseling, and school), fewer studies have documented the relationship between perceived levels of stress and overall wellness throughout the student experience (El-Ghoroury, Galper, Sawaqdeh, & Bufka, 2012; Peluso, Carlton, & Asmundson, 2011). In their study, El-Ghoroury et al. (2012) found that major stressors (e.g., time, financial constraints, limited opportunity to engage in positive coping behaviors) were significantly associated with reduced overall health and performance. Interestingly, in a list of coping strategies that graduate students used to reduce stress, regular exercise ranked fourth out of 20, accessing mental health services ranked sixth, and accessing/utilizing spiritual resources ranked ninth. Although El-Ghoroury et al. (2012) did not specifically report a general theory underlying their definition of general wellbeing, the participants in the study identified with the major facets typically associated with general health and wellbeing, namely the spiritual, physical, social, and mental dimensions of health. The previously-mentioned relationships between stressors and health in graduate students is especially relevant during the final year of graduate study, during which clinical psychology graduate students prepare to apply to, and interview at, prospective internship sites. This internship period represents the culmination of knowledge and skills acquired throughout previous graduate study and training, and the stress associated with the interview process may negatively impact the applicant's overall health and wellness.

Internship Application Process

Internship is the capstone clinical training experience for clinical psychology doctoral students, and is the culmination of years of study and training within their respective programs. During the final year of the program, each doctoral candidate must identify potential internship sites and submit an application to each site. A recent study reported that, on average, pre-doctoral internship applicants submitted an average of 14.47 applications (*SD* = 4.15) in order to maximize the likelihood of obtaining interviews and favorable match results, and obtained an average of 7.81 (*SD* = 3.42) offers for interviews (Callahan, Collins, & Clonoff, 2010)[1].

[1] An examination of the participant match rates from this study revealed much higher rates than those seen in the overall pre-doctoral internship applicant population. Specifically, the study match rate was 85.2% with 96.4% of those matched obtaining APA-accredited internships, whereas the overall population APPIC match rates for 2010 were just 77% (APPIC, 2010). As such, it is probable that applicants from the larger population obtained fewer interviews than the study population, although that data is not tracked by APPIC.

Following the application period, internship sites invite the top applicants to participate in a round of interviews to assess program fit between the applicant and the internship training director and staff, professional demeanor, and quality of previous practicum experience (Ginkel, Davis, & Michael, 2010). In their study, Ginkel et al. (2010) conducted a survey of internship sites affiliated with APPIC regarding inclusion and exclusion criteria for prospective intern applicants. Results from the survey indicated that applicant “fit” with the site was the most important factor, followed closely by the applicant’s performance in the interview. The internship interview, then, represents a critical gateway in which the applicant must perform at his or her best in order to improve chances of obtaining an internship.

After the interview period, both applicants and internship sites are required to submit rank-ordered lists of their top choices to the Association of Psychology Postdoctoral and Internship Centers (APPIC), with applicants listing their preferred internship sites, and internship sites listing their preferred applicants. APPIC then matches applicants and internship sites based on the respective rank-order lists in a process known as “The Match”. Applicants are then notified of the results of the matching process, typically in late February. The entire process, with the culminating event being the release of match results, is called “matching” or “The Match” within the graduate training programs, and culminates with the release of the match results.

As a pre-doctoral internship is a required step in earning a doctoral degree, it is critical that applicants obtain interviews and match with an internship site. Furthermore, many future positions of employment require an American Psychological Association (APA) or Canadian Psychological Association (CPA) accredited internship (e.g., Veterans Affairs, government facilities). In recent years, there has been an unfortunate imbalance between the number of internship sites available and the number of applicants, with the most recent match statistics in 2013 indicating 2,515 possible positions and 4,481 applicants (APPIC Board of Directors, 2013). This represents a match rate of just 56%. The imbalance between the number of internship applicants and sites has increased to such an extent that it is currently described as a "crisis" in the field (Wells et al., 2014). As such, there is a significant likelihood that the internship interview period will be extremely stressful, as the applicant must prepare for each interview, often travel great distances, invest significant financial resources, and disrupt personal routines. Additionally, applicants in the past have reported increased stress due to the continuous uncertainty surrounding applications, interviews, match results, and future possibilities (Sullivan, 2006).

Given the importance of the internship to the future of a pre-doctoral internship applicant, as well as the uncertainty and stress associated with the internship process itself, it is likely that the cumulative stress and anxiety may have a significant negative impact on the applicant's overall health and wellness. A review of psychological and medical databases (PsychInfo, MedLine, PsychArticles) revealed no previous studies examining the relationship between the stressors associated with the internship application process and applicant health and wellness as they develop over time. An examination of the proposed relationship will provide the necessary background and data to support the development of an empirical intervention, with the future goal of improving applicant health throughout the pre-doctoral internship interview process.

The Current Study

The current study assessed the overall health and wellness of pre-doctoral internship applicants through the duration of the internship application and interview process utilizing objective physical activity monitoring technology, nutrition tracking, and twice-weekly online surveys. The study was organized into three phases. Phase I consisted of baseline, pre-interview period assessment of overall health and wellness, beginning in mid-November and lasting three weeks. Phase II included the interview period, which occurred during the month of January and lasted for four weeks. Phase III consisted of a three-week period assessing return to baseline, and lasted for three weeks following the release of match results.

H_1: It is hypothesized that pre-doctoral applicants will report significantly reduced overall health during the interview phase (Phase II) as compared to Phases I and III.

H_2: It is also hypothesized that participants who match in late February will revert to pre-interview (Phase I) levels of health and wellness during Phase III.

H_3: It is hypothesized that participants who do not match in late February will not demonstrate an improvement during Phase III in overall health and wellness compared to Phase I and II.

H_4: It is hypothesized that individuals who score comparatively higher in resilience will report better overall functioning across phases as compared to individuals who score lower on resilience.

CHAPTER II

Method

Participants

Forty-one participants were recruited from APA-accredited clinical, counseling, and school psychology doctoral-degree granting universities via a participation request sent by email to the program's Director of Clinical Training (DCT). In the email, the author provided basic details regarding the scope of the study, indicated that the study was approved by the IRB committee, and asked that the DCT forward the email to all potential participants within his/her program. Prospective participants met the following criteria if the participant was 1) currently enrolled in an APA-accredited clinical, counseling, or school psychology doctoral program, 2) planning on applying for an internship position beginning in the year 2015, and 3) willing to participate in the study including completing weekly assessments over three distinct time periods lasting from three to four weeks each.

Measures

Demographic questionnaire. Participants completed a demographic questionnaire comprised of questions assessing age, gender, ethnicity, country of origin, year in current program, number of internship sites to which the participant applied, number of internship interviews obtained, and match outcome.

Patient -Reported Outcomes Information System (PROMIS) scales. PROMIS is a consortium funded by the National Institutes of Health with the purpose of creating questionnaires and item-pools which assess health and wellbeing across a wide range of domains, including physical health, chronic diseases, mental and emotional health, and social health. The PROMIS scales were developed using general population samples as well as clinical samples assessing functioning in both adult and pediatric populations. Measures are available in short form, computer adaptive testing, and profile formats. Each PROMIS scale was developed using the following methods: literature review, identification of a conceptual framework, development of item banks, testing of the initial item banks, and psychometric analyses using classical test theory (CTT) and item response theory (IRT). As the author was selecting measures of health across multiple domains, the PROMIS scales were chosen over the SF-36 (Ware & Sherbourne, 1992) as the PROMIS scales allowed for a more tailored approach to examining the specific domains within the IS-Wel model. For example, several of the subscales found within the SF-36 ("bodily pain" subscale and "vitality" subscale) did not match up with the proposed sub-domains of global health and wellness as proposed in the IS-Wel model. The PROMIS database, with its wide array of well-validated, short measures, better fit the current model. Additionally, the use of the valid short forms on several of the domains also minimized the required time for completion by the participants. This was done in an effort to remove obstacles to study participation and increase response rates.

PROMIS Sleep Disturbance scale. The PROMIS Sleep Disturbance Scale is an eight-item measure that assesses self-reported perceptions of sleep quality, sleep depth, and restoration following the sleep period. This includes problems falling sleep, staying asleep, and perceived satisfaction with sleep. Each item in the Sleep Disturbance Scale is scored on a 5-point Likert scale, with the first question ranging from 1= *Very Poor* to 5= *Very Good*, and the following seven items ranging from 1= *Not at all* to 5= *Very much*.

The Sleep Disturbance Scale was normed using 1993 community-based individuals representing a non-clinical, normal population, as well as 259 individuals recruited from various treatment clinics at the University of Pittsburgh Medical Center. Both samples had adequate demographic heterogeneity. In the validation study, a comparison of results from each of the known groups (clinical vs. non-clinical) yielded significant differences between the two groups, indicating that the Sleep Disturbance Scale is able to effectively detect sleep problems and discriminate between clinical and non-clinical populations (Buysse et al. 2010).

PROMIS Emotional Distress- Depression and Anxiety scales. The PROMIS Emotional Distress- Anxiety and Depression scales are four item short-form measures designed to rapidly assess symptoms of anxiety and depression. Developed as part of the overarching PROMIS mandate to develop widely applicable health assessment measures, the anxiety and depression scales were normed using both general and clinical populations. The PROMIS Emotional Distress- Anxiety scale was normed using a total sample of 14,836 individuals (13,631 general population, 1,205 clinical population) obtained from an online government survey site, Polimetrix, as well as PROMIS research sites (Pilkonis, Choi, Reise, Stover, Riley & Cella, 2011). The PROMIS Anxiety scale demonstrated solid internal consistency, with a mean adjusted item-total correlation of .79, and an Alpha coefficient of .93. Similarly, it demonstrated excellent external validity as it was correlated with a legacy measure- the Mood and Anxiety Symptom Questionnaire (MASQ; Watson, Clark, Weber, Assenheimer, Strauss, & McCormick, 1995). The convergent correlation score was $r = .80$. The PROMIS Emotional Distress- Depression scale was normed using a total sample of 14,839 individuals (13,632 general population, 1,207 clinical population) obtained using the same sources as the anxiety scale. The PROMIS Depression scale demonstrated similar reliability and consistency, with a mean adjusted item-total correlation of .83, and an Alpha coefficient of .95. The Emotional Distress- Depression scale also demonstrated adequate convergent validity with the Center for Epidemiological Studies- Depression scale (CES-D; Radloff, 1977), a well-supported legacy measure used to assess symptoms of depression for over two decades. The PROMIS Depression scale attained a convergent correlation score of r = .80, indicating that the two measures assess the same underlying construct.

PROMIS Social Support- Emotional Support and Informational Support scales. The PROMIS Social Support- Emotional Support and Informational Support scales were developed to assess specific components of a higher-order construct of social health. Specifically, PROMIS researchers conceptualized both social emotional and informational support as secondary constructs beneath the higher order "Quality of Social Support" construct, such that increased emotional and informational support reflected an increase in quality of social support, and thereby, social health and wellbeing (Hahn et al., 2010). Each of these scales are composed of four items, with response options on a five-point Likert scale ranging from 1 = *Never* to 5 = *Always*. The PROMIS Emotional Support and Informational Support were normed using a general population sample of 753 individuals through the Polimetrix site previously mentioned. The measures demonstrated adequate reliability (r = .96) as well as average convergent validity with the SF-36 Social Functioning scale (r = .59).

Perceived Stress Scale-10. The Perceived Stress Scale-10 (PSS-10; Cohen & Williamson, 1988) is a shortened version of the full Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). The PSS-10 measures reactions to daily stressors, and is comprised of 10 items that load onto two factors, Perceived Helplessness and Perceived Self-Efficacy. Response options on the PSS-10 fall on a five-point Likert scale ranging from 0 = *Never* to 4 = *Very often*. The PSS-10 demonstrated adequate reliability, with Cronbach's alpha levels ranging from .82 to .89. The PSS-10 has been validated as an acceptable tool to measure stress in a college student population (Roberti, Harrington, & Storch, 2006). In this study, the PSS-10 demonstrated excellent internal consistency (Cronbach's $\alpha = 0.89$) and convergent and divergent validity (convergent validity with the State-Trait Anxiety Inventory - Trait, Pearson's $r = 0.73$, p , .0001; divergent validity with the Sensation Seeking Scale- Form V, Pearson's $r = -0.04$, $p > .05$).

Daily Spiritual Experiences Scale. The Daily Spiritual Experiences Scale (DSES; Underwood & Teresi, 2002) was developed with the goal of measuring variables including perceived relationship with the transcendent, inspiration, inner harmony, awe, gratefulness, and mercy. The DSES was designed in such a way that the term *God* could be replaced by the concept of something divine or a transcendent aspect of life, depending on the preference of the responding individual. The DSES consists of 16 items, 15 of which are rated on a 6-point Likert scale ranging from 1= *many times a day,* to 6= *never or almost never*, with item number 16 being rated on a 4-point Likert scale ranging from 1= *not close at all* to 4= *as close as possible*. The DSES demonstrated moderate to high internal consistency, with Cronbach's alpha values at .88 for test and .92 for retest.

FitBit Zip physical activity monitor. The FitBit Zip is a relatively new, public consumer oriented tri-axial physical activity monitor produced by the FitBit company (www.fitbit.com/zip). The device utilizes a MEMS 3-axis accelerometer to monitor steps taken, distance traveled, and calories burned. It has wireless sync capabilities, and is designed to be work either around the waist or on the shirt. Tri-axial accelerometers have been used in research to monitor physical activity for several decades, and have provided valuable objective measurement for researchers assessing relationships between physical activity and a variety of health-related concerns. Areas of current research with accelerometers include physical activity in the elderly (Gemmill, Bayles, McTigue, Satariano, Sharma, & Wilson, 2011), preschool children and parents (Ruiz, Gesell, Buchowski, Lambert, & Barkin, 2011), individuals with Down Syndrome (Matute-Llorente, González-Agüero, Gómez-Cabello, Vicente-Rodríguez, & Casajús, 2013), and overweight individuals in weight loss programs (Rittenhouse, Salvy, & Barkley, 2011). Cordero, Lopez, Barrilao, Blanque, Segovia, and Cano (2014) conducted a review of accelerometer-based studies and concluded that the use of accelerometers in physical activity research may be a reliable and effective method for objectively activity across a wide range of individuals. Recent studies assessing physical activity frequency and intensity have reported significant discrepancies between an individual's self-report and the objective measure by an accelerometer (Downs, Van Hoomissen, Lafrenz, & Julka, 2014; Schuna, Johnson & Tudor-Locke, 2013; Sirard, Hannan, Cutler, & Nuemark-Sztainer, 2013). For example, Schuna et al. (2013) found that participants reporting at least 150 minutes of moderate-to-vigorous physical activity (MVPA) per week on a self-report measure were objectively found to engage in just 87 minutes per week of MVPA, on average. This significant discrepancy between objective measure and self-report highlights the usefulness of technology that is currently available. Prior to the development and use of accelerometers as a means of tracking physical activity, researchers typically used self-report measures, such as the International Physical Activity Questionnaires (Craig et al., 2003), which is susceptible to bias and recall error. Additionally, over the last decades, objective measures of physical activity, such as accelerometers, have typically been used solely in research settings. More recently, however, the increasing popularity of consumer-level physical activity monitors has resulted in the greater availability of monitors to the general public (e.g., FitBit, Jawbone, Shine, Nike FuelBand, Actical, Actigraph, etc.), providing the opportunity for any individual to objectively measure and track his or her physical activity levels.

Some concern has been noted, however, regarding the validity of the ever-expanding list of popular monitors (Lee, Kim, & Welk, *in press*). In their study, Lee et al. compared mean absolute percentage error (MAPE) for several different popular brands of accelerometer with a portable metabolic system, which measured the true metabolic output during an extensive exercise routine. They found that only a few of the popular monitors' energy expenditure estimates fell within ten percent of the true metabolic expenditure as measured by the portable metabolic system. As such, they indicate that, although popular, many of the accelerometer-based physical activity monitors currently available may not be accurate or valid estimations of real actual energy expenditure, and require further validation testing. The FitBit Zip was one of the few monitors that fell within the 10% error range, and was identified as an acceptable monitor of physical activity (Lee et al., *in press*).

Timeline Follow Back-Exercise. The Timeline Follow Back-Exercise (TLFB-E; Panza, Weinstock, Ash, & Pescatello, 2012) protocol consists of a traditional monthly calendar that assesses physical activity over the course of the last month. Specifically, the TLFB-E assesses the frequency, intensity, time, and type of exercise (FITT components). Individuals completing the TLFB-E are asked to fill in the days on which they engaged in physical activity, with the corresponding FITT components included for each period of physical activity. The TLFB-E has demonstrated acceptable correlation with objectively measured physical activity (i.e., tri-axial accelerometer; $r = .35$ to .39, $p < .01$) and has demonstrated adequate test-retest reliability ($r = .79$ to .97) in a sample of college students. The TLFB-E was administered at the end of each phase as a failsafe measure in the event that a participant does not provide his/her accelerometer data.

MyPlate calorie tracking. Participants were asked to track their food intake two days a week for the duration of the study. MyPlate (www.livestrong.com/myplate) is an online calorie-tracking application that individuals may use to record food eaten throughout the day. The application has an extensive database of common and brand-name foods, including meals available through popular restaurant chains. MyPlate provides users with daily summaries of calories consumed by macro (protein, fat, carbohydrate), and has been supported as a valid calorie-tracking research tool (Levine, Abbatangelo-Gray, Mobley, McLaughlin, & Herzog, 2012). Food intake data was broken down into macro-nutrient categories (fat, carbohydrates, and protein) and calculated as raw percentages. Previous research has indicated that one of the key indicators of dietary composition is the relative percentage of fat intake (Oenemna, Brug, Dijkstra, de Weerdt, & de Vries, 2008; Vandelanotte, Bourdeaudhuil, & Brug, 2007), with a recommended percentage of total calories being less than 30% (Aranceta & Pérez-Rodrigo, 2012).

Connor -Davidson Resilience Scale. The Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) is a 25-question measure that assesses resilience within both general and clinical populations. Factor analysis of the CD-RISC yielded five factors encompassing the perception of personal competence, tolerance of negative affect, strengthening in the face of adversity, positive acceptance of change, control, and spiritual influences. Response options to the questions are on a five-point Likert scale, ranging from 0 = *Not true at all* to 4 = *True nearly all of the time*. Internal consistency assessment for the CD-RISC yielded a Cronbach's α of 0.89, and the item-total correlations ranged from .30 to .70. Convergent and divergent validity analysis indicated strong convergence with another hardiness measure (Pearson's $r = 0.83$, $p < .001$), as well as significant divergence from the Perceived Stress Scale-10 (PSS-10; Pearson's $r = -0.76$, $p < .0001$). The CD-RISC has been validated with a wide variety of populations, both within the United States as well as internationally, including with women with HIV (Dale, Cohen, Weber, Cruise, Kelso, & Brody, 2014), Chinese military (Xie, Peng, Zuo, & Li, 2016), young adults from Spain (Notario-Pacheco, Solera-Martìnez, Serrano-Parra, Bartolomè-Gutièrrez, Garcìa-Campayo, & Martìnez-Vizcaìno, 2011), and adults in France suffering from fibromyalgia (Scali, Gandubert, Ritchie, Soulier, Ancelin, & Chadieu, 2012).

Procedures

The Director of Clinical Training (or the titled equivalent) of each APA-accredited, doctoral-level clinical, counseling, and school psychology program was sent an invitation email to be forwarded to potential participants. The email briefly described the intent of the study as well as the benefits and costs associated with participation. The email also contained a link to a SurveyMonkey survey that provided additional information as well as served to screen the participants' eligibility and allow them the opportunity to provide their informed consent. Upon providing informed consent, each participant provided basic demographic information as well as his or her address so that the principal investigator could send him/her a FitBit prior to the beginning of the study. An informational packet with detailed instructions accompanied the FitBit device, thereby enabling the participant to set up a FitBit account with a shared password for the data uploads as well as set up a MyPlate account with a shared/common password for dietary tracking on the specified days. At the end of the study, participants were sent an email reminder instructing them to change their passwords for the MyPlate and FitBit applications in order to maintain privacy of sensitive information. Participants were allowed to keep the FitBit monitors at the conclusion of the study as an incentive for participating.

During the study, each participant was asked to wear the FitBit Zip physical activity monitor every day for each phase of the study, as well as fill out online questionnaires every Thursday and Sunday night. The participants were asked to fill out questions on the online survey for the past three or four days, or since the last time that the participant filled out the questionnaire. The measurement days of Thursday and Sunday were chosen as they fall at the end of both the weekday and weekend period, and it is likely that participants will provide higher response rates for these days than for a Friday or Saturday evening. Additionally, participants were asked to track all of the foods eaten that day (Thursday or Sunday) via MyPlate. The decision to track eating patterns on Thursday and Sunday was reviewed and supported as valid by a well-published researcher in the field (J. De Castro, November 25, 2014).

In order to promote the highest levels of survey response compliance possible, the participants were reminded on the days that they need to fill out survey information. In the initial online survey, participants were notified that they would be sent reminder emails to the email address provided therein. Follow-up emails were sent to participants who had not completed the online survey by the day following the response period.

The study was conducted in three phases using an interrupted time series design. Phase I consisted of gathering baseline data, in which the participant wore the FitBit, tracked food consumption via MyPlate, and filled out the surveys on the specified days. Phase I (Baseline Phase) began on November 10, 2014 and concluded on December 1, 2014. Phase II (Interview Phase) began on January 5, 2014 and continued through February 2, 2015. Following this period, Phase III (Post-Interview Phase) consisted of return-to-baseline reporting from March 2, 2014 to March 22, 2015.

Data Analysis

Data analysis was conducted in several steps. First, participant demographics were analyzed, and frequency and descriptive statistics were obtained. Assumptions of normality were assessed on each indicator variable, and necessary transformations to ensure normality were conducted using the *R* software platform (https://www.r-project.org/). Participant responses were analyzed for frequency and consistency. A cut-off score of 80% of valid, complete responses per phase of total possible response days was utilized, as this represented no more than two missed days per phase. Specifically, for responses to be included, participants had to respond to a minimum of seven out of eight possible survey days during Phases I and III, and ten out of a possible twelve days during Phase II. Setting minimum thresholds for response consistency increased the confidence in consistent, accurate reporting and allowed for a more representative and valid phase mean scores for indicator variables.

Next, descriptive statistics and correlations of the variables of interest across time periods were analyzed. For each phase, participant responses were averaged over all reporting days in that phase (Pre-Interview Baseline, Interview, and Post-Interview phases) to generate an individual average statistic (i.e., grams of fat per day consumed on average during the pre-interview phase, average daily stress during the interview phase, etc.). These averages for each variable were compared to the corresponding variables for the other phases using paired-sample *t*-tests.

Exploratory factor analysis (EFA) was then conducted assessing emergent factors, as changes in the indicator variables were hypothesized to affect the first-order latent variables for the associated health sub-domains, as well as the second-order latent variable of overall health and wellness (**Figure 2**). EFA allowed for the examination of the extent to which the indicator variables (PROMIS Anxiety, PROMIS Depression, MVPA, PROMIS Emotional Support, etc.) were correlated with the respective first-order latent variables, as well as the degree to which the indicator variables accounted for the observed variability.

Next, Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted to assess model fit, as well as correlations between indicator variables, first-order latent variables, and second-order latent variables both within phase and between phases. PLS-SEM was used an alternative to conventional confirmatory factor analysis methods, as it has improved ability to work with small sample sizes, including samples with non-parametric distributions (Goodhue, Lewis, & Thompson, 2012; Hair, Hult, Ringle, & Sarstedt, 2016). As the current second-order factor of global health is theoretically comprised of the five, first-order factors in the IS-Wel model, and the theory proposes that the general health factor is a consequence of the unique contribution of each first-order factor, a formative measurement model was produced wherein there are causal arrows from the first-order factors to the second-order factor of global health. This is in direct contrast to the reflective measurement model, wherein the second-order factor of global health would influence the first-order factors (Hair, et al., 2016).

Within structural equation modeling, there are key differences between reflective and formative approaches to modeling, and these differences are associated with the conceptual directionality or causality of the model. A reflective measurement model is based on classical test theory, in which measures are observable manifestations of an underlying construct. The measures, also called indicators, are viewed as a representative sample of all possible aspects of the latent construct. Additionally, the removal of one item or indicator does not change the definition or outcome of the latent variable (assuming high indicator reliability), as all items essentially measure the same facet of a construct. In contrast, formative measurement models conceptualize a latent variable as a linear combination of multiple causal indicators. Within the formative model, the combination of the indicator variables explains the totality of the latent variable, with each variable accounting for one facet of a multi-faceted construct. As opposed to the reflective measurement model, the deletion or removal of an indicator in a formative measurement model would remove meaning of the construct, and significantly alter what the construct essentially is. As a result, it is critical that formative measurement cover the breadth of the construct based on theory or previous research (Hair et al., 2016). To ensure appropriate assessment of the proposed construct, measures were selected that conformed to the theoretical model of global health as proposed by Hattie and colleagues (2004), specifically consisting of measures of physical, mental, social, and spiritual health, as well as perceived stress. Psychometric support for the validity of the selected measures as valid indicators of each proposed domain is abundant and has been provided above in the Measures section.

As the proposed model is formative in nature as compared to a reflective model, assessing model fit is somewhat challenging. In reflective models, latent constructs are hypothesized to drive or cause indicator scores, and the composite-based structural equation modeling (CB-SEM) technique is typically utilized to assess fit estimates parameters in an effort to minimize differences between the theoretical model and the sample covariance matrix. Thus, the goodness-of-fit measures such as the χ^2 statistic can be evaluated as indicators of overall model fit. This is in contrast to the formative measurement model. With the formative measurement model in PLS-SEM, the goal is to ensure that the latent variable accounts for as much of the observed indicator variance as possible, as opposed to minimizing differences between theoretical and observed covariance matrices. As such, typical goodness-of-fit indicators fail to accurately describe the validity of the overall model. The fit of the formative model depends on the model structure, as well as additional fit evaluations discussed below.

All PLS modeling was conducted using the software Smart PLS (Hair et al., 2016) with the goal of assessing the validity of combining first-order components to comprise a global measure of health. In order to assess model fit, the author created a composite factor score for each factor, by phase. Subsequently, the second-order factor (global health) was assessed using the first-order factor scores by phase as indicator variables. This allowed the author to evaluate both model fit as well as changes in global health over time

Finally, a MANCOVA analysis was conducted to assess changes in a composite health factor, adjusting for resilience, which was included in the model as a covariate. The MANCOVA analysis was as an alternative to a conventional structural equation modeling approach, which allows for an assessment of latent variable means. This option was not available in the current study due to the software platform used to conduct the PLS modeling, given the small sample size. The MANCOVA allowed the researcher to assess change in global health over study phase, adjusting for participant resilience. In the event of a significant interaction between phase and resilience, simple slopes were examined by using a median split for resilience, forming “High” and “Low” resilience categories and examining change in health within each of these groups.

CHAPTER III

Results

Demographics

During the enrollment period following the invitation dissemination, 41 participants completed the initial online questionnaire and were sent FitBit activity monitors with the accompanying introduction and instructional packet. **Figure 1** describes the participant and participant mortality rates by phase. Of the 41 initial participants, 34 (82.9%) completed the initial setup, responded to the first regular survey, and registered their FitBit activity monitors. Demographic characteristics are presented in **Table 1**. Of the 34 initial responding participants, ages ranged from 24 to 40, with a mean of 28.7 years (*SD* = 3.57). Twenty-nine of the participants identified as female (85.3%), with the remaining five participants identifying as male (14.7%). The majority of participants self-identified as "Non-Hispanic, White" (*n* = 29, 85.3%), with two self-identifying as Asian (5.9%), two as "Other" (5.9%), and one as "Hispanic or Latino" (2.9%). Twenty-two participants reported current enrollment in clinical psychology doctoral programs (64.7%), while seven participants were from school psychology doctoral programs (20.6%), three from combined doctoral programs (8.8%), and two from counseling psychology doctoral programs (5.9%). Of the 34 participants who originally completed at least 80% of Phase I surveys, 28 (82.3%) completed 80% of surveys for Phase II. Furthermore, of the original 34 participants, 22 (64.7%) completed at least 80% of surveys for Phase III, resulting in an overall participant drop-out rate of 35.3%. To assess for possible differences between participants who completed all three phases with at least 80% response rates (*N* = 22) and those who did not (*N* = 14), the researcher conducted an ANOVA analyzing differences on demographic and health variables. Results indicated that there were no significant differences between participants who completed the study and those who did not with regards to race (F (1, 35) = .549, p = .464), gender (F (1, 35) = 1.146, p = .292), age (F (1, 35) = 1.25, p = .271), or global health at Phase I (F (1, 35) = .366, p = .549).

Testing assumptions of normality

Following the demographics analysis, scores on each indicator variable were analyzed for normality, and were transformed to ensure the closest approximation to normality possible (**Table 2**). This was accomplished using the *R* software platform (https://www.r-project.org/), with the "Box-Cox" and "symbox" packages. A Box-Cox transformation represents a continuum of power transformations that provide a range of options for data calibration and normalization (Osborne, 2010). Specifically, the following formula by Box and Cox (1964), $y_t^{\lambda} = (y_t^{\lambda} - 1) / \lambda$ where $\lambda \neq 0$; $y_t^{\lambda} = \log_e(y_i)$ where $\lambda = 0$ where *lamda* (λ) is the power exponential, estimates the effects of a range of transformations of the data by a specific power (i.e., $\lambda = 0.50$: square root transformation; $\lambda = 0.00$: natural log transformation; $\lambda = -1.00$: inverse transformation; etc.). This allowed the author to select the appropriate data transformation that ensured the closest approximation of normality possible. Additionally, the "symbox" statistical package in the *R* software platform provided a box-plot graph of the transformed distribution, allowing for a visual assessment of normality along Tukey's (1977) ladder of powers graphically depicting the data under inverse, square root, logarithmic, etc. transformations. Based on the results of the Box-Cox transformation, the following transformations were completed: Moderate-Vigorous Physical Activity (MVPA), daily grams of fat, daily grams of carbohydrates, daily grams of protein, and PROMIS Anxiety measures were all transformed using a logarithmic function (log; $\lambda = 0.10$). The Perceived Stress Scale was transformed using a square root function ($\lambda = 0.50$). PROMIS Emotional Support and Informational Support were both transformed using the square functioning ($\lambda = 2.00$). Finally, the PROMIS Sleep Disturbance and Depression scales were both transformed using the inverse square root function ($\lambda = -0.50$). The Daily Spiritual Experiences Scale (DSES) closely approximated normality and did not require transformation. The resulting distributions adequately satisfied the basic assumptions of normality and allowed for further analyses.

Paired-Sample T-tests

Subsequently, a series of pairwise *t*-tests were conducted to assess significant change on an indicator level between phases (**Table 3**). Results from the paired-samples *t*-test indicated that scores on the Sleep Disturbance (PROMIS Sleep Disturbance) measure were significantly higher in Phase II ($M = 17.2$, $SD = 5.75$) than in Phase III ($M = 15.0$, $SD = 5.00$), $t(34) = -2.60$, $p = .014$, $d = 0.44$, indicating improved sleep in Phase III as compared to Phase II. Scores on the PROMIS Depression measure decreased significantly from Phase I ($M = 6.37$, $SD = 2.60$) to Phase II ($M = 5.76$, $SD = 2.29$), $t(34) = -2.41$, $p = .022$, $d = 0.41$, indicating a reduction in reported feelings of depression. PROMIS Anxiety scores also decreased significantly, dropping between both Phase I ($M = 8.55$, $SD = 2.51$) and Phase III ($M = 6.94$, $SD = 2.51$), $t(34) = 3.68$, $p < .001$, $d = 0.58$; and Phase II ($M = 8.00$, $SD = 2.74$) and Phase III ($M = 6.94$, $SD = 2.51$), $t(34) = 3.43$, $p = .002$, $d = 0.62$. Finally, PROMIS Informational Support increased significantly from Phase II ($M = 16.5$, $SD = 2.95$) to Phase III ($M = 16.9$, $SD = 2.67$), $t(34) = -2.45$, $p = .020$,

$d = 0.41$. No other paired-samples t-tests met the $p < .05$ criteria for significance at the indicator level. Paired-sample t-tests for first-order latent factors revealed no significant changes between phases for any factor (e.g., physical health, mental health; **Table 4**). Overall, none of the first- or second-order latent variables changed significantly across any phase, indicating steady levels of global health throughout the internship process.

Exploratory Factor Analysis

Each of the first-order latent factors with multiple indicator measures (Physical Health, Mental Health, and Social Health) were analyzed to assess the relationship between the first-order factor and the proposed indicator measures. Exploratory factor analyses (EFA) for each factor indicated that the respective indicator variables for each measure loaded onto a single factor. For the Physical Health factor, a single component was extracted, with an Eigenvalue of 1.34, accounting for 44.6% of the total variance. For the Mental Health factor, one factor was extracted with an Eigenvalue of 1.65, accounting for 82.4% of the total variance. For the Social Health factor, the single component yielded an Eigenvalue of 1.73, accounting for 86.3% of the total variance. The latent factors of Stress and Spiritual Health were each assessed using a single indicator measure, the PSS-10 and DSES, respectively. Psychometric properties for these are discussed above in the Measures section.

Partial Least Squares Structural Equation Modeling

To assess the proposed global health model (**Figure 2**), the author utilized partial least squares structural equation modeling (PLS-SEM). As the second-order factor of global health is theoretically comprised of five unique factors (Physical Health, Mental Health, Social Health, Spiritual Health, and Stress; **Figure 2**), each of the factors should demonstrate a significant degree of correlation to the second-order factor, with a conservative correlation set at $p < .01$.

Within a formative model, correlations are described by factor loadings and factor weights. Factor weights are the results of a multiple regression with the latent variable scores as the DV and the indicator scores as the IV. As such, one hundred percent of the second-order latent variable is explained by the contribution of each of the indicators. Assessment of factor loadings is a secondary and complementary method of determining significant relationships between indicator and latent variables within the overall model. Specifically, a factor loading is the degree of an indicator variable's absolute contribution to the latent variable (also described as the indicator's absolute importance; Hair et al., 2016). This is determined by a simple, bivariate correlation between the indicator and the latent variable. In situations where the factor weight is not determined to be a significant contributor to the latent variable, and thus be at risk of being dropped from the model, Hair and colleagues (2016) recommend assessing the indicator variable's factor loading to assess absolute contribution. Per Hair and colleagues, "When an indicator's outer weight is nonsignificant but its outer loading is high (i.e., above 0.50), the indicator should be interpreted as absolutely important but not relatively important. In this situation, the indicator would generally be retained" (Hair et al., 2016, p. 149). An initial assessment of the overall model resulted in unacceptable factor loading and factor weight scores, with the Spiritual Health factor score overwhelming the model (**Figure 3**). As such, the model was trimmed to four factors: Mental Health, Physical Health, Social Health, and Stress (**Figure 4**). A follow-up analysis of the factor loading and factor weight scores indicated overall improved fit; however, the first-order factor of Stress remained nonsignificant over both areas on both factor weights and factor loading. Upon eliminating the Stress factor, acceptable levels of factor loadings and weights were achieved ($p < .001$; **Figure 5**). This indicated that the best fit for the data was a three-factor model of global wellness (**Table 5**).

Upon obtaining acceptable factor loading and factor weight scores, complete bootstrapping was run with the recommended 5,000 subsample size using the Bias-Corrected and Accelerated (BCa) Bootstrap method. In the analysis, missing values were replaced with the mean as the missing data percentage was under 10%, a Path Weighting Scheme was selected, and the maximum iterations limit was set to the default value of 300. Upon completion of the initial analysis, model fit was assessed. Recent research examining fit for formative models within PLS-SEM has used the standardized root mean square residual (SRMR) as a possible valid indicator of model fit. For example, Henseler and colleagues (2014) assessed the SRMR statistic and found that the commonly accepted maximum level of variance of 0.08 in CB-SEM was too restrictive, and that acceptable levels for PLS-SEM were likely higher. The SRMR for the three-factor model of global health was 0.14, falling above the proposed limit of 0.10 (Henseler et al., 2014), however other fit indices such as the d_LS (squared Euclidean distance) and the d_G (geodesic distance) both indicate good model fit, with *p*-values of less than $p = .001$. The d_LS estimate resulted in an original sample score of 0.89 ($t = 9.94$, $p < .001$) for the saturated model, whereas the d_G estimate resulted in an original sample score of 0.87 ($t = 4.99$, $p < .001$) for the saturated model. RMS_theta (the root mean squared residual covariance matrix for the outer model residuals; Lohmoller, 1989) was not calculated, as it is a purely reflective indicator of fit. The assessment of collinearity, or the degree to which indicators significantly covary, was conducted utilizing the variance inflation factor (VIF). The maximum observed value of VID among the indicators was 3.08 (Mental Health, Phase II), with the rest of the indicator factors falling at or below 2.25. All of the VIF scores fall well under the 5.00 guideline proposed by Hair and colleagues (2016), indicating that collinearity was not a concern. Based on the factor weights and loadings results for the trimmed three-factor model, acceptable model fit estimates, and lack of collinearity, the model appears to be an acceptable descriptor of the data obtained. As these variables validly comprised a global health factor, the researcher was reasonably confident in creating a composite health factor using factor analytic methods and saving factor scores for each participant, which were in turn examined in the repeated measures MANCOVA described below.

Repeated-Measures MANCOVA

The repeated-measures MANCOVA [between-subjects factor: Phase (Phase I, Phase II, Phase III); covariate: resilience] was conducted using the SPSS statistical software package, version 21. For the analysis, Mauchly's test of sphericity was significant $W = .584$, χ^2 (2) = 10.2, $p = .006$, indicating that the matrix does not have approximately equal variances and covariances over phase. To adjust for the possibility of an inflated Type I error, the Greenhouse-Geisser correction was used to assess for within-subject effects. Results indicated that health did not significantly change over study phase $F(1, 22) = .669$, $p = .470$, $\eta_p^2 = .032$ (**Figure 6**). Additionally, the covariate, resilience, was not significantly related to health over study phase $F(1,22) = 1.09$, $p = .330$, $\eta_p^2 = .051$, indicating that interpersonal differences in resilience did not influence health status.

CHAPTER IV

Discussion

To the author's knowledge, this study represents the first assessment of possible changes in global health and wellness among an internship-applicant population across the application and interview process. Drawing upon previous research by Myers and colleagues (Myers & Sweeney, 2008; Myers, Mobley, & Booth, 2003), we assessed the proposed five areas of global health and wellness: Physical Health, Mental Health, Social Health, Spiritual Health, and Stress.

Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the author assessed the validity of the overall five-factor model. Results indicated good model fit for a three-factor model comprised of physical health, social health, and mental health. These empirically-derived results are at odds with previous research conducted on the IS-Wel model (Sweeney & Whitmer, 1991; Witmer & Sweeney, 1992; Hattie et al., 2004) which indicates some question as to the validity of the model. It should be expected that valid and reliable measures of the specified sub-domains/first-order factors (including spiritual health and stress) would fit well with the proposed five-factor model of health. This represents an area of future research, as it is possible that the model is a result of the measure upon which it is based, rather than the ideal combination of theoretical and empirical support. It is of interest, however, that these results complement the current (and historical) model of health used by the World Health Organization (retrieved from http://www.who.int/about/mission/en/, 16 August, 2016; World Health Organization, 1948).

The author hypothesized that both the second-order latent variable of global health as well as the first-order latent variables mentioned above would change significantly between phases, with Phase I establishing a baseline. It was also predicted that stress would increase and the health variables would demonstrate a general decrease from Phase I (Application/Baseline) to Phase II (Interview), however those trends would reverse during Phase III (Post-Match), and global health and wellness would improve for all participants during Phase III. Based on related research, the authors also examined the relationship between resilience and changes in health across the three periods, predicting that those individuals who reported higher levels of resilience would experience improved global health as compared to those who reported lower levels of resilience.

The results of the study indicated nonsignificant changes in global health at the general and specific factor level, with physical health, social health, mental health, and spiritual health all staying relatively consistent across the board. Results did indicate, however, that specific sub-domains in health and wellness did change. Specifically, when the authors compared levels of depression, anxiety, quality of sleep, and information support between phases, there were significant differences, such that each of these sub-domains improved in the Post-Match phase (Phase III) as compared to either Phase I or Phase II.

There are several possible reasons for the lack of predicted changes in health across phases. It is possible that, by the time doctoral graduate students arrive at this critical period in their doctoral training, they have developed adequate coping skills and routines that allow them to effectively manage the associated stress and challenges of the internship application period. This hypothesis would agree with the study mentioned previously (Myers et al., 2003), wherein Myers and colleagues found that advanced doctoral students demonstrated higher global health scores as compared to the general population as well as first-year doctoral students. Additionally, it is possible that, due to the unique training and field of the doctoral candidates, they have internalized these effective and adaptive coping techniques that have enabled them to cope with periods of increased stress, resulting in only minimal changes in overall health and functioning. In addition to these substantive reasons, it is also possible that the lack of statistically significant differences is due to a limitation of the research design as described below. Specifically, it is possible that the lack of observed significant changes in health may be due to the time constraints inherent to the study. As Phases I, II, and III covered three, four, and three weeks, respectively, with significant breaks in time between phases (approximately one month each), it is possible that the measured periods of time were not sufficient to capture meaningful changes in health. Additionally, it is also possible that the breaks between phases also represented periods in which participants were able to rest and regroup, moderating the effect of the stressors of the internship application and interview process.

Limitations

Limitations to the current study are also areas for future research. One of the major limitations of this study was the limited sample size, primarily due to funding limitations. Initially, the authors had projected an initial sample size of 40. Factoring in an estimated ten percent dropout rate per phase, the final phase would have yielded a final sample size of 32 participants. This number would have improved statistical power and perhaps result in additional significant results. Future research would benefit by increasing the overall sample size. Additionally, the observed mortality rate was high, such that out of the original 41 participants, 34 responded to the first survey, and just 22 (53.7%) responded to surveys greater than eighty percent of the time during Phase III. This reduced the power of the study to identify significant trends and correlations.

One factor that may have influenced the high mortality was the lack of external incentives beyond the FitBit Zip to motivate continued participation, as participants were notified during the initial briefing that they would be able to keep the activity monitor. Future researchers may implement a contingency management program to incentivize continuous responding through each phase, with scaled reinforcers by phase (Washington, Banna, & Gibson, 2014; Weinstock, Barry, & Petry, 2008). An additional limitation is the method of tracking physical activity. Although the use of physical activity monitors has been demonstrated to be significantly more accurate in estimating total energy expenditure than self-report (Downs, Van Hoomissen, Lafrenz, & Julka, 2014; Schuna, Johnson & Tudor-Locke, 2013; Sirard, Hannan, Cutler, & Nuemark-Sztainer, 2013), there are still inherent weaknesses with this method. For example, a physical activity monitor is unable to effectively track certain types of exercise, including resistance training (i.e., weightlifting), swimming, and yoga. The reliance on actual physical steps may present a limitation in the range of physical activity tracking. Although there exist several instruments for tracking these types of activity, the state of the science is such that it is difficult to combine and adjust total physical activity to include both monitor and self-report data.

As the use of MyPlate as a measure of food intake is based on participant recall, this presents another study limitation. The primary concern is that participants either may not recall all of the food they consumed during the previous day, or underestimate portion size. This would introduce error in the totals, as they would be an under-representation of the true amount of calories and macronutrients the participant ate. Despite this, the use of calorie tracking applications with large item databases that have been vetted for content remains an improvement over pure recall as well as portion and content estimation.

Despite several limitations, the study also presented significant strengths. One of the strengths of the study was the geographical representation of the sample. Participants in the current study represented different areas of the United States, ranging from Alaska to Florida, New York to California. Additionally, the gender representation closely approximated that of the professional psychology graduate student population in the United States. Another strength of the study was the use of more objective physical activity monitors, as past research has indicated a positive bias towards over-reporting levels of physical activity in a self-report format (Downs et al., 2014; Schuna et al., 2013; Sirar et al., 2013). Also, the current study utilized measures drawn from the PROMIS database, which are well validated across a wide variety of populations and have excellent reliability. This reliance on empirically-supported measures increases the confidence and reliability of study results. Finally, tailoring the interrupted time series design to match distinct phases of the internship process from the application phase to the post-match phase allowed for a more accurate assessment of the changes in health during each period.

In conclusion, results of the assessment of global health over three distinct periods spanning five months indicated that, on average, participants were able to maintain levels of global and domain health. This would also indicate that, despite the extremely stressful process of applying to and interviewing at potential internship programs, as well as waiting for news of match results, professional psychology doctoral students are able to maintain health across the broad physical, mental, and social domains despite some changes in specific subdomains. It is encouraging, however, that in the sub-domains with significant change, all of the indicators changed in a direction that indicated increased health and wellness. While this is encouraging, and speaks to the resilience of applicants, limitations of the current study restrict the generalizability of the findings. Future internship applicants would benefit by increased research in this important area, as it may generate the development of interventions designed to maximize health during this critical period.

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Table 1

Demographic Characteristics of Study Sample at Phase 1

Variable (n = 34)	
Age, Mean (*SD*)	28.7 (*3.62*)
	n (%)
Gender (n=34)	
Female	29 (85.3)
Male	5 (14.7)
Ethnicity (n=34)	
Hispanic or Latino	1 (2.9)
White	29 (85.3)
Asian	2 (5.9)
Other	2 (5.9)
Program Type (n=34)	
Clinical	22 (64.7)
Counseling	2 (5.9)
School	7 (20.6)
Combined	3 (8.8)

Table 2

Means and SD for Participant Scores on Wellness Measures, by Phase

Variable	Phase I	Phase II	Phase III
Mental Health Factor			
PROMIS-ED- ANX	8.55 (*2.51*)	8.00 (*2.74*)	6.94 (*2.51*)
PROMIS ED-DEP	6.37 (*2.60*)	5.76 (*2.29*)	5.77 (*2.27*)
Physical Health Factor			
MVPA (mins/day)	69.7 (*54.0*)	53.0 (*52.3*)	38.2 (*53.6*)
PROMIS-SD	16.2 (*5.75*)	17.2 (*6.54*)	15.0 (*5.00*)
Dietary Fat Intake (grams/day)	67.9 (*33.0*)	63.9 (*32.1*)	59.0 (*28.2*)
Social Health Factor			
PROMIS Emotional Support	17.8 (*2.28*)	17.3 (*2.61*)	17.4 (*2.34*)
PROMIS Informational Support	16.9 (*2.40*)	16.5 (*2.95*)	16.9 (*2.67*)
Spiritual Health Factor			
Daily Spiritual Experiences Scale	44.2 (*16.0*)	45.8 (*16.6*)	45.1 (*20.0*)
Stress Health Factor			
Perceived Stress Scale-10	19.6 (*4.21*)	17.8 (*5.04*)	17.9 (*5.33*)

Table 3

Paired Samples t-test results by variable

Variable (*with transformation*)	**Mean**	***SD***	**t**	**df**	**Sig. (2-tailed)**
MVPA Phase I – MVPA Phase II	.041	.125	1.95	35	.059
MVPA Phase II - MVPA Phase III	-.001	.140	-.078	35	.938
MVPA Phase I - MVPA Phase III	.039	.127	1.85	35	.074
Percent Fat Phase I – Percent Fat Phase II	-.001	.109	-.053	29	.958
Percent Fat Phase II – Percent Fat Phase III	.019	.081	1.29	29	.209
Percent Fat Phase I – Percent Fat Phase III	.018	.121	.808	29	.426
PSS-10 Phase I – PSS-10 Phase II	.125	.397	1.82	32	.078
PSS-10 Phase II – PSS-10 Phase III	.005	.254	.117	32	.908
PSS-10 Phase I – PSS-10 Phase III	.131	.435	1.73	32	.094
PROMIS-SD Phase I – PROMIS-SD Phase II	.007	.024	1.816	34	.078
PROMIS-SD Phase II – PROMIS-SD Phase III	**-.007**	**.016**	**-2.60**	**34**	**.014**
PROMIS-SD Phase I – PROMIS-SD Phase III	.000	.021	.011	34	.991
PROMIS-ES Phase I – PROMIS-ES Phase II	13.9	55.7	1.481	34	.148
PROMIS-ES Phase II – PROMIS-ES Phase III	-1.18	27.9	-.250	34	.804
PROMIS-ES Phase I – PROMIS-ES Phase III	12.8	51.6	1.47	34	.152
PROMIS-IS Phase I – PROMIS-IS Phase II	5.32	52.9	.595	34	.556
PROMIS-IS Phase II – PROMIS-IS Phase III	**-9.25**	**22.3**	**-2.45**	**34**	**.020**
PROMIS-IS Phase I – PROMIS-IS Phase III	-3.92	49.3	-.471	34	.640
PROMIS-DEP Phase I – PROMIS-DEP Phase II	**-.003**	**.006**	**-2.41**	**34**	**.022**
PROMIS-DEP Phase II – PROMIS-DEP Phase III	-.000	.008	-.112	34	.911
PROMIS-DEP Phase I – PROMIS-DEP Phase III	-.003	.008	-2.10	34	.043
PROMIS-ANX Phase I – PROMIS-ANX Phase II	.027	.078	2.017	34	.052
PROMIS-ANX Phase II – PROMIS-ANX Phase III	**.045**	**.079**	**3.43**	**34**	**.002**
PROMIS-ANX Phase I – PROMIS-ANX Phase III	**.072**	**.116**	**3.68**	**34**	**.001**

Table 4

Paired Samples t-test results by factor

Factor	Mean	*SD*	t	df	Sig. (2-tailed)
Physical Health Phase I – Physical Health Phase II	.101	.804	.592	21	.560
Physical Health Phase II – Physical Health Phase III	.079	.684	.477	16	.640
Physical Health Phase I – Physical Health Phase III	-.001	.795	-.002	16	.998
Mental Health Phase I – Mental Health Phase II	.046	.668	.376	29	.710
Mental Health Phase II – Mental Health Phase III	-.036	1.86	-.090	21	.929
Mental Health Phase I – Mental Health Phase III	-.066	1.73	-.178	21	.861
Social Health Phase I – Social Health Phase II	.064	.664	.531	29	.599
Social Health Phase II – Social Health Phase III	-.139	.342	-1.90	21	.071
Social Health Phase I – Social Health Phase III	-.120	.585	-.964	21	.346

Table 5

Latent Variable Formative Measurement Model, Global Health

Latent Variable	Indicator	Loadings/ Weights	Mean (SD)	*t*-value
Global Health	Physical Health Composite Score	.767	.758	9.58**
	Mental Health Composite Score	-.813	-.798	9.25**
	Social Health Composite Score	.792	.795	10.6**
Global Health	Physical Health Composite Score	.773	.778	10.9**
	Mental Health Composite Score	.886	.882	21.3**
	Social Health Composite Score	.846	.848	18.2**
Global Health	Physical Health Composite Score	.874	.868	16.8**
	Mental Health Composite Score	-.729	-.712	4.86**
	Social Health Composite Score	.877	.887	30.4**

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

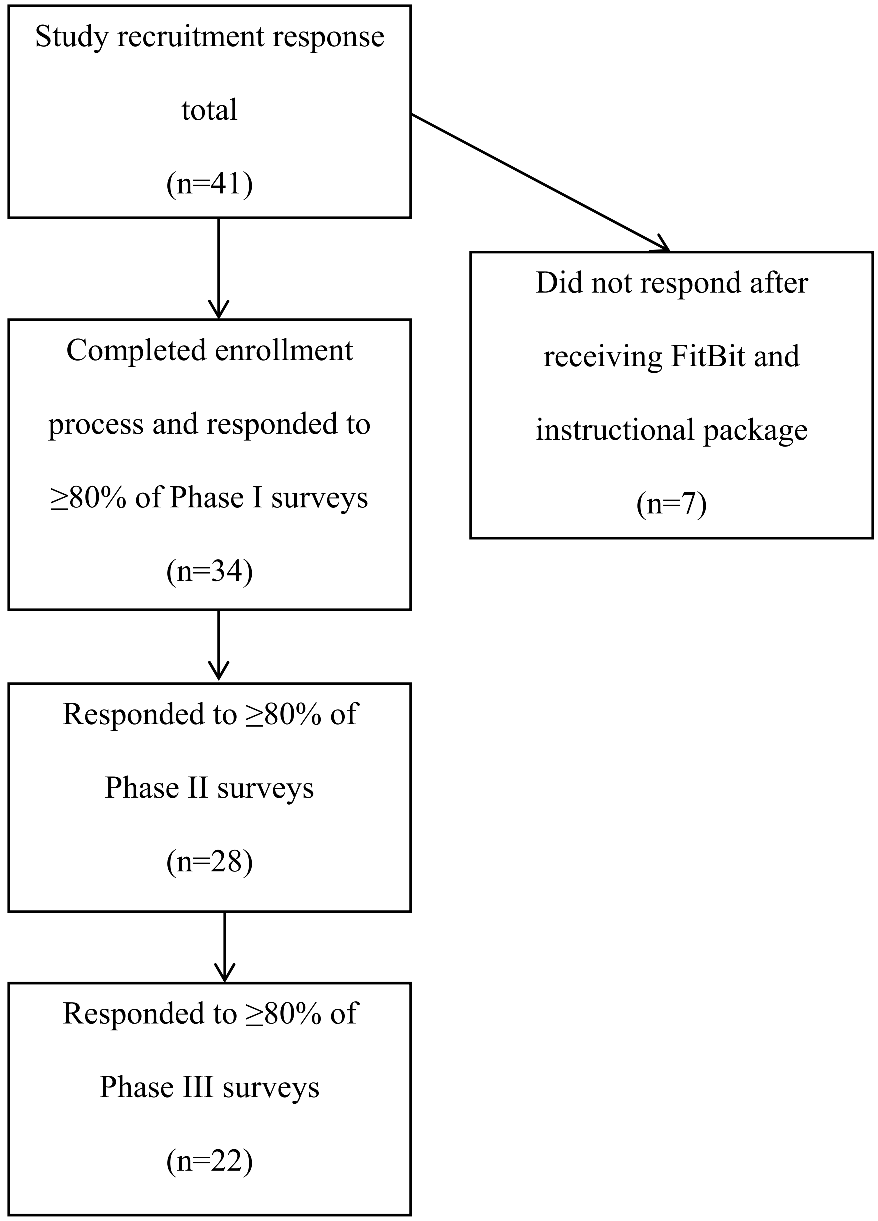

Figure 1. Study Participation Flowchart

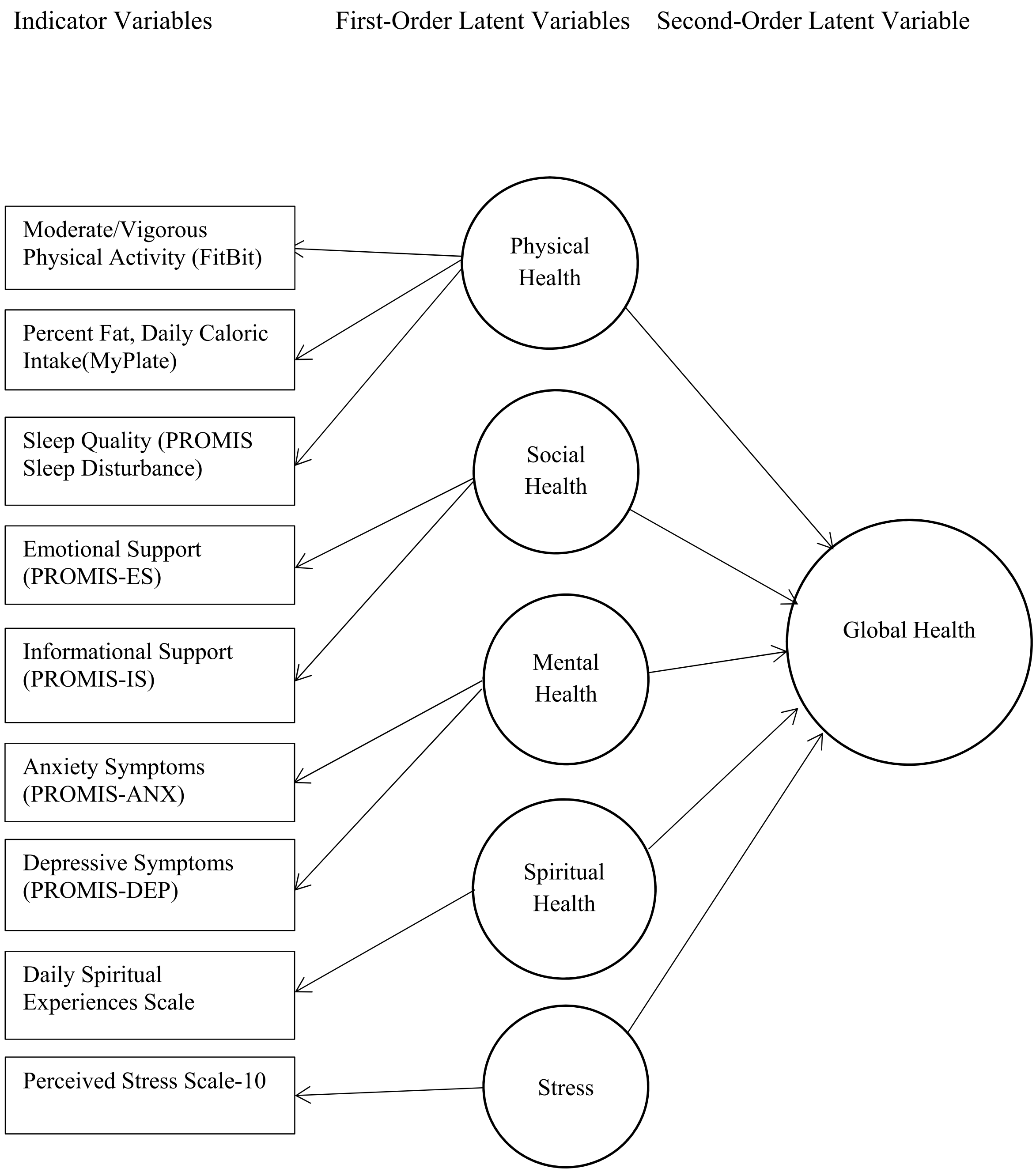

Figure 2. Proposed Global Health Model

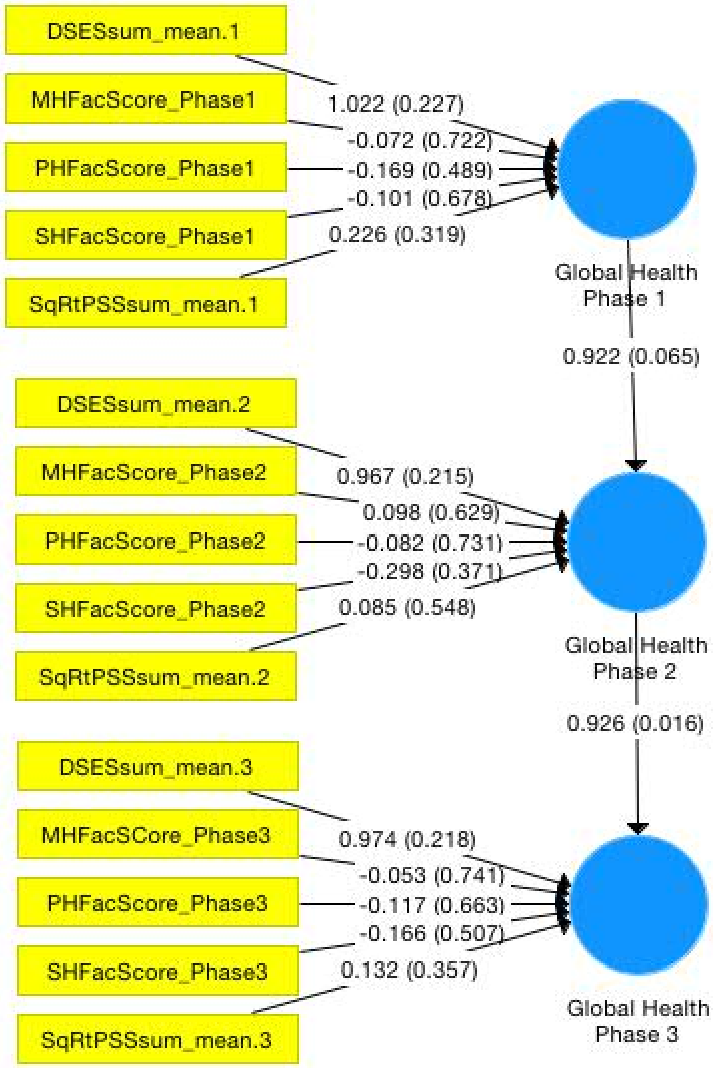

Figure 3. Partial Least Squares Structural Equation Model, Five-Factor

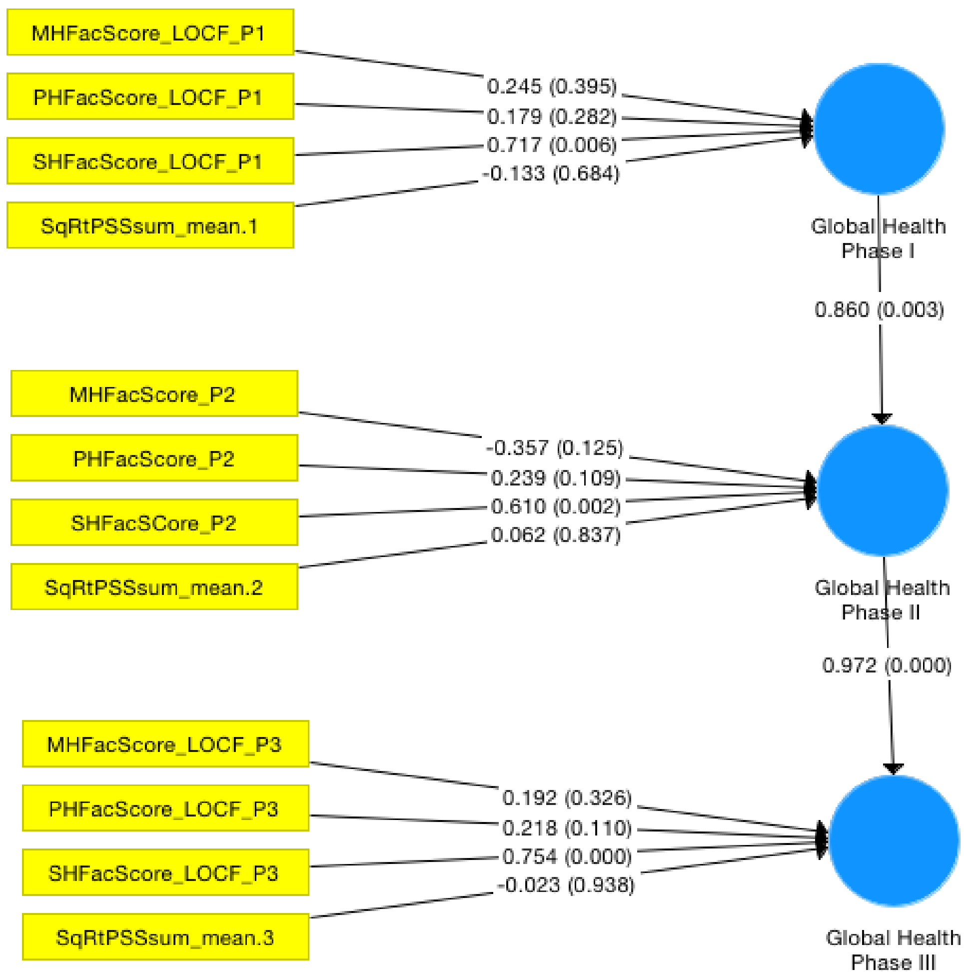

Figure 4. Partial Least Squares Structural Equation Model, Four-Factor

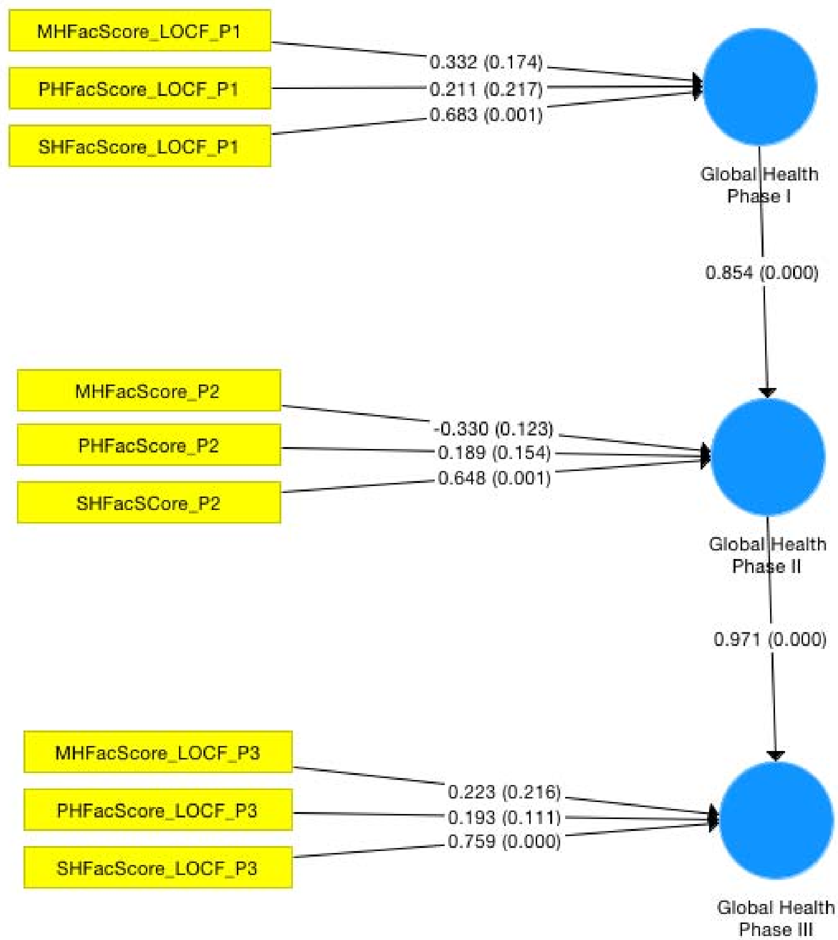

Figure 5. Partial Least Squares Structural Equation Model, Three-Factor

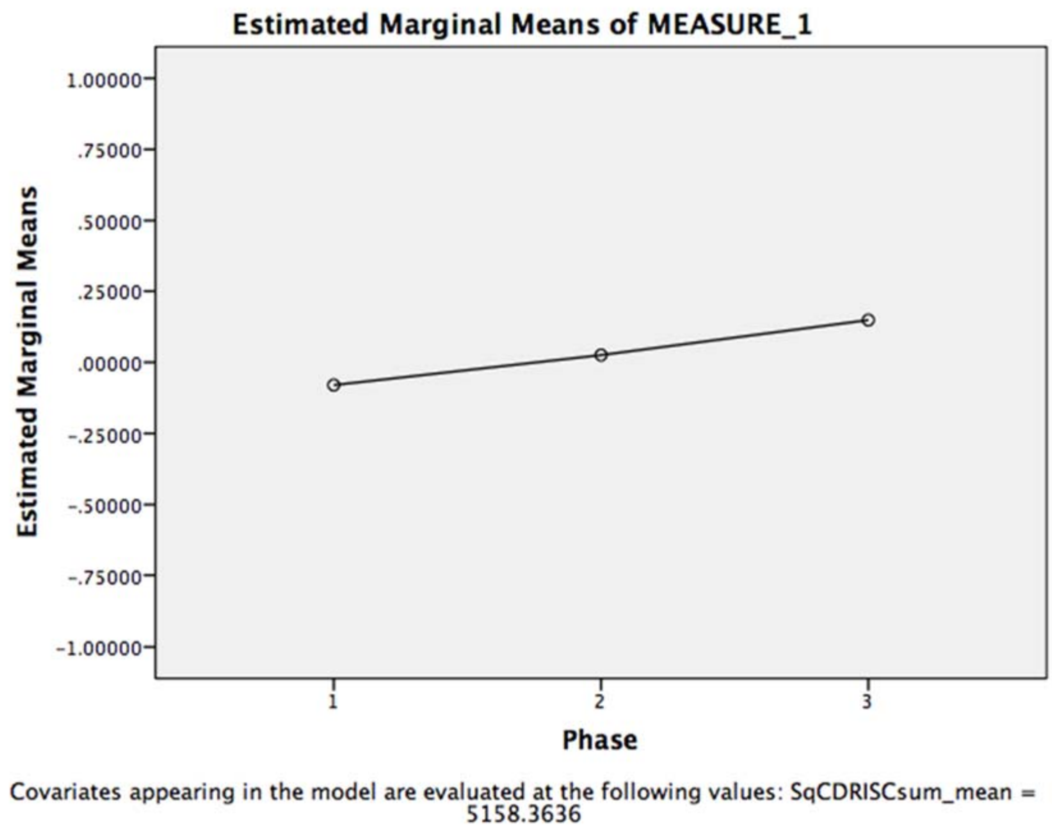

Figure 6. Global Health Means Values by Phase

VITA

John M. Manning, M.A.

Employment Experience

06/20/2016-Present	Clinical Psychology Intern at Brooke Army Medical Center, United States Army, San Antonio, TX.
08/24/2011-06/19/2016	Research Assistant, Department of Psychology and Philosophy, Sam Houston State University, Huntsville TX. Conduct research and run a research lab consisting of 6 research assistants under the direction of faculty supervisor. Currently running four studies with NIMH grant funding. 20 hours per week.
08/27/2009-08/01/2011	Research/Teaching Assistant, Western Kentucky University, Bowling Green, KY. Assisted as lecturer for 2 undergraduate courses, ran research lab for faculty supervisor. 20 hours per week.
02/02/2009-08/15/2009	Psychological Technician, Catalyst Residential Treatment Center, Brigham City, UT. Worked with adolescent males in substance use recovery programs, served a mentor and supervisor, conducting co-therapy with a licensed psychologist. 40 hours per week. Supervisor: Kreg Edgmon, Ph.D., LMFT
09/17/2004-01/31/2009	Shop foreman, Bear Cabin Cabinets, Smithfield, UT. Worked as a shop foreman producing custom cabinetry for a business netting $1.2 million/year in profits. 40 hours per week. Supervisor: Kallen Peterson

Civilian Education

08/25/2011-Present	Doctor of Philosophy in Clinical Psychology, Sam Houston State University, Huntsville, TX (In progress)
08/27/2009-12/31/2011	Masters of Art in Clinical Psychology, Western Kentucky University, Bowling Green, KY

08/24/2003-12/13/2008	Bachelors of Science in Psychology, Utah State University, Logan, UT

Certifications and Special Skills

09/2013	Applied Suicide Intervention Skills Training- Trainer
10/2016	Cognitive Processing Therapy training
02/2017	Prolonged Exposure Therapy training

Military Experience

Utah Army National Guard	2007-2011	SPC	13D
United States Army Reserve	2011-2016	1LT	70B
United States Army	2016-Present	CPT	73B

Military Education

07/12/2007	Basic Combat Training, Ft. Jackson, SC
09/06/2007	Advanced Individual Training, Field Artillery- 13D, Ft. Sill, OK
05/13/2011	Reserve Officers Training Corps, Western Kentucky University, Bowling Green, KY
09/12/2012	Army Medical Department Basic Officers Leaders Course (BOLC), Ft. Sam Houston, TX

Military Job Experience

09/07/2007-08/13/2009	Fire Direction Control Specialist (13D), 1/A/1-145th FA, UTNG, Logan, UT Bravo Team Leader
08/14/2009-09/06/2012	Simultaneous Membership Program (SMP) Cadet, 149th BSB, KYNG, Bowling Green, KY

09/12/2012-06/05/2015	Medical Operations Officer, 420^{th} EN BDE, USAR, Bryan, TX
06/06/2015-06/07/2016	Commander, HHC 420^{th} EN BDE, USAR, Bryan TX
06/20/2016-Present	Intern, United States Army Clinical Psychology Internship Program (CPIP), Brooke Army Medical Center, San Antonio, TX

Professional Organization Membership

09/2012-Present	Texas Psychological Association, Legislative Committee member
08/2011-Present	American Psychology and Law Society (AP-LS), Student Affiliate
09/2009-Present	American Psychology Association, Student Affiliate

Professional Scholarship

09/2015	Association for Behavioral and Cognitive Therapies conference, Chicago, IL. The Impact of Daily Physical Activity on Daily Alcohol Use. Authors: Henderson, C. & Manning, J.
03/2015	American Psychology and Law Society conference, San Diego, CA. A Study Space Analysis of Response Style Among Hispanics in Competency to Stand Trial Research. Authors: Manning, J., MacKenzie, S., Munoz, C., Wang, S., McLaughlin, J., & Kan, L.
08/2014	American Psychological Association conference, Washington D.C. Synthetic marijuana usage among a juvenile offender sample. Authors: Colbourn, S., Woods, C., Tomei, J., Jeon, H., Manning, J., Utely, J., & Henderson, C.

09/2014 — Annual Meeting of the Southwestern Psychological Association, Wichita, KS. Social physique anxiety: Feeling states, calorie restriction, and exercise in college students. Authors: Spies-Upton, S. A., Henderson, C., Graham, J., Colbourn, S., & Manning, J.

08/2013 — American Psychological Association convention, Washington D.C. Relationships between daily physical activity, mood, and alcohol use among college students. Authors: Henderson, C., Manning, J., Tomei, J., Colbourn, S., Spies-Upton, S., Fraser, T., Oden, G., Hyman, B.

03/2013 — American Psychology and Law Society conference, New Orleans. Hispanic Subgroup Differences as a Moderator of Treatment Effects in Multidimensional Family Therapy. LA. Authors: Manning, J. & Henderson, C.

Volunteer Experience

10/2009-2016 — Scoutmaster, Boy Scouts of America

08/2009-2011 — Volunteer Translator- Spanish; The Medical Clinic, Bowling Green, KY,